Limits to increased production of forest products in California

Over the last decade, a number of factors have affected production of forest products in California. These include:

- natural factors;
- land management legacies;
- loss of timber base to non-timber growing uses;
- restrictions on timber growing;
- industry factors including sawmill, construction and residential, pulp and paper, and structure and market considerations.

Natural factors

Natural factors such as wildfire, pests, and exotic species can affect long-term timber supply and can disturb managed forests. The effect of wildfire on timber is a particular concern in California. Due to the successful fire suppression efforts over the last 50 years, California has accumulated excessive fuel loads on its timberland. In many places this creates an increased risk of high-intensity, stand-replacing wildfires that can destroy previous investments in forest plantings as well as natural regeneration following harvest.

Fire, along with drought, creates an ideal condition for trees to become more susceptible to pests and forest diseases. In addition, dense forest stands that result from successful fire protection and lack of management to thin stands can create conditions that support and spread forest insects. See the Assessment paper Forest Pests and Diseases for a further discussion.

Salvage of dead and dying trees: Not all timber killed or damaged by fire or disease is lost from commercial use. Based on CDF's forest practice database, from 1989 to 1999 emergency harvests to salvage timber on California's timberland outside national forests averaged 66,971 acres annually. Many more acres are harvested under exemption harvest plans every year in order to salvage this timber.

Along with fire and insects, noxious weeds invade timberland and can impede regeneration of commercial trees reducing timber supply. Noxious weeds are typically not native and exhibit aggressive growth. Yellow starthistle, gorse, French broom, Scotch broom, and wheatgrass are some of the major noxious weeds currently invading California's timberland. During the last decade, technologies that utilized herbicides, insects, fungi, and other biological controls to these noxious weeds were developed and practiced. However, noxious weeds are still a significant issue.

Land management legacies

The condition and potential of a forest stand to grow wood may be related to catastrophic natural events (such as wildfire, wind, heavy rains or landslides), past harvesting practices, or the success of regeneration following harvest or wildfire. Resultant stand conditions include: (1) stands that do not have a full compliment of trees (growing stock); (2) stands that have been overtaken by competing vegetation (such as brush or hardwoods); or (3) stands that lost key productive elements such as soil or the ability to shade young seedlings. For example, a significant segment of North Coast forest lands have a much higher hardwood component than what existed before commercial logging. In these stands, hardwoods

typically comprise the dominant overstory species, making it difficult to grow higher value conifer species.

Another type of legacy is the impact of past harvesting practices on wildlife or fish habitat. Past harvesting reduced the acreage of older, larger trees that can be important to wildlife habitat. In some areas, past harvesting and road building activities led to continuing sedimentation of watercourses and loss of riparian habitat. While these activities may not directly limit the ability of a site to grow timber, they have resulted in increased regulations that restrict further practices and sometimes limit harvestable acreage on private lands. In some cases, privately owned lands may also be withdrawn from timber production and devoted to habitat as part of wildlife conservation plans.

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Still another legacy is California's former property tax laws. Under these laws, repealed in the mid-1970s, landowners who harvested 70 percent of the volume in a stand could hold the other 30 percent exempt for a minimum of 40 years or until it was mature. This provision encouraged heavy harvesting, and usually the big, healthy trees were cut. Under some circumstances, this harvesting approach could be used multiple times on the same land base. Over time, the quality of the stand could be lessened because of high quality residual trees providing seed and stand structure that encouraged regeneration were reduced.

The tax laws reinforced a tendency common in previous decades called "highgrading." Highgrading is the removal of the most commercially valuable trees, often leaving a residual stand composed of trees of poor condition or species composition. This practice can have genetic implications and long-term economic or stand health impacts (Helms, 1998). One impact of this kind of harvesting is to reduce the overall stand age and potentially the quality of residual trees used as seed stock.

Highgrading was also encouraged by California's land division process. Under this process landowners can divide larger parcels into four smaller parcels without meeting subdivision requirements. In the case of forest land, landowners could purchase larger parcels (say 160 acres), cut the most valuable trees to pay off the property, then divide the land into four parcels (say 40 acres). New landowners would again harvest the remaining most valuable trees to pay off the property.

The result of high grading has left some forest stands with significantly reduced standing volumes compared to what could be grown. However, while widespread, the impact of this practice on forest productivity has not been measured. One resultant legacy of high grading may be in the current trend to use "transition" silvicultural systems to convert these lower volume stands to more highly productive stands.

Loss of timberland base to non-timber growing uses

The changing land base from which timber is harvested is an important factor affecting forest products output. The most significant factors are the decline in the land base available for harvest due to changes in ownership and conversion of timberlands to other uses.

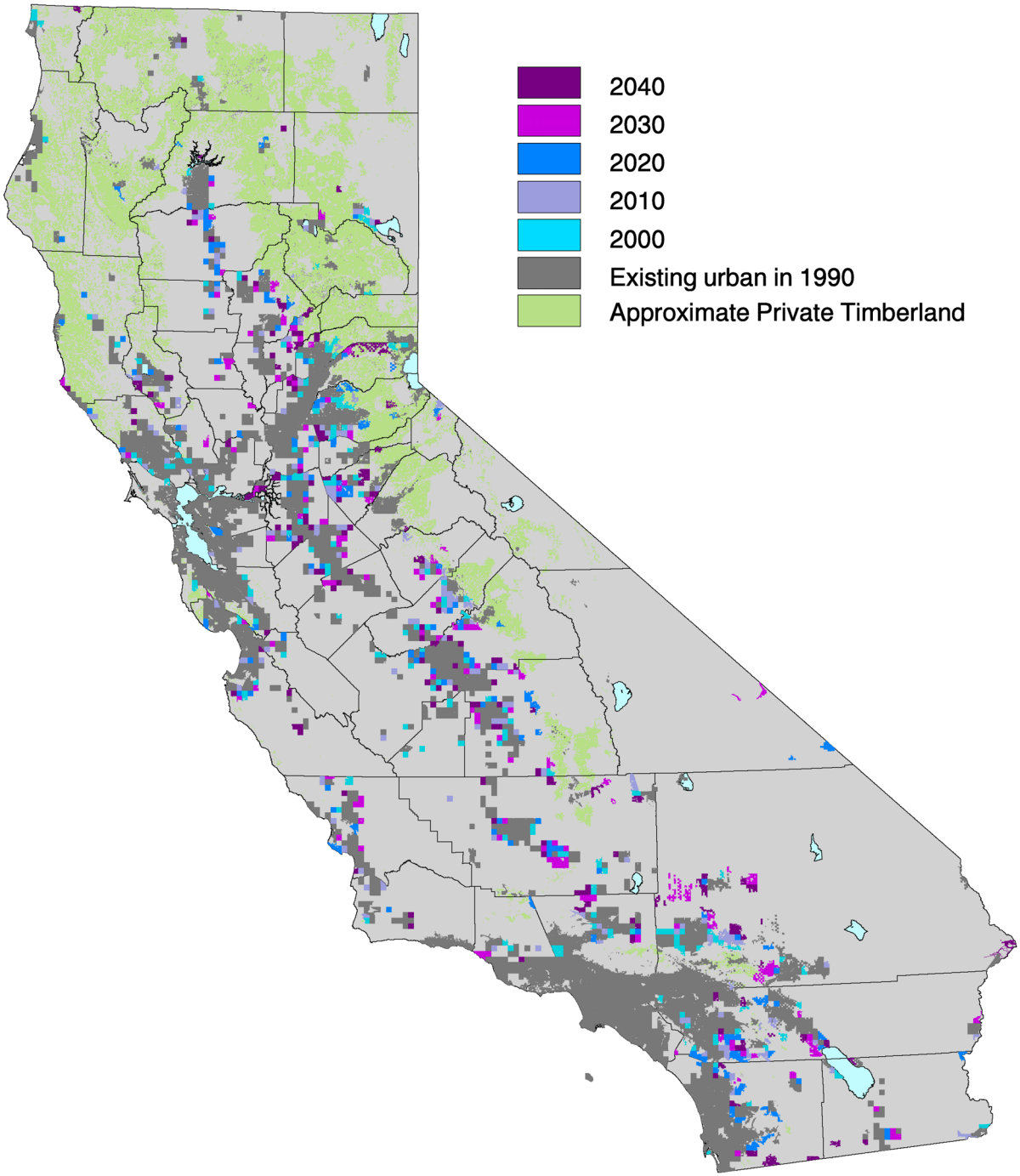
While large decreases in acreage due to urbanization and agricultural conversion have occurred to the overall forest land base, the most productive component, called "timberlands," has remained relatively stable over the last half century but has changed in its ownership configuration (Shih, 2002). Of greatest concern to timber production levels is the transfer of land to public ownership where often the land is set-aside, or "reserved" from timber harvest. This scenario has been seen in several large transfers, including the 1999 "Headwaters" acquisition of private redwood forests in Humboldt County and the reclassification to national monument of over 300,000 acres of timberlands in the Sequoia National Forest.

The relatively little change in the timberland base due to conversion for other land use purposes is reflected by the area of "timberland conversion permit." The average annual private acreage of timberland converted from 1981 to 2000 is approximately 113,000 acres. The purposes of conversion have varied; but over the last two decades, the predominant purpose has been for housing development. See the online paper Timberland Conversion in California from 1969 to 1998 for more information (Shih, 2002).

Timber ownerships have also changed significantly over the last decade. Since 1990, there has been a reduction of the number of large timberland owners and consolidation into fewer, larger ownerships. This is especially true in the Sierra. A different kind of investor has also emerged—firms that do not have timber growing as a principal source of income. This shift may signal different management goals and approaches.

In some regions, urban and rural growth will encroach on timberland over the next decades (Figure 23). Over the next 50 years (1990-2040), approximately 768 thousand acres are projected to be affected by urban land conversion and rural residential parcelization of timberlands. Perhaps the most significant impact of this development is the pressures to further subdivide existing forest land parcels. In many places, forest land parcels have already been broken into smaller parcels, further complicating timber management and increasing management costs.

Figure 23. Projected urbanization in relation to timberland area



Source: Fire and Resource Assessment Program (FRAP), 2003

Restrictions on timber growing

In all regions of California, timber growth exceeds harvest. This does not mean that timber will be available for harvest in the future. Compared to a decade ago, federal agencies make much less timber available for sale and follow different management practices that may have significant implications on long run of timber supply. At the same time, management changes on federal lands in California are leading to significant increases in net volume but with greater risk to forest insects and fire in dense unmanaged stands. Except for the removal of small diameter materials to lessen fire hazard and to improve forest health, continuation of current policies will not provide any significant increase in harvested logs.

On private lands, there are increased restrictions on the harvest of timber. These affect the purchase or withdrawal of private lands for purposes other than timber growing, and changing ownership and investment patterns in the timber industry. Governmental restrictions continue to influence private timberlands (Table 12).

Table 12. Government agency influence on timberlands

Federal agencies with jurisdiction	Areas of Influence	State agencies with jurisdiction	Areas of influence
U.S. Fish and Wildlife Service	Species, habitat impacts	California Department of Fish and Game	Species, habitat impacts
U.S. Forest Service	Concerns over watershed impacts of harvesting	CDF	Restocking and harvesting practices
U.S. Bureau of Land Management	Concerns over watershed impacts of harvesting	California Department of Food and Agriculture	Forest pests and exotics
U.S. Environmental Protection Agency	Air, water, coastal resources	California Department of Parks and Recreation	Historic and cultural resources
National Marine Fisheries Service	Anadromous fish protection	California Air Resources Board/Local Air Quality Management Districts	Air quality and use of prescribed fire
		California State Water Resources Control Board/Regional Boards	Water quality
		California Department of Pesticide Regulation	Pesticides, herbicides

Forest regulation in the United States: A 1993 study conducted by the USFS found that 117 state and 522 local laws and regulations influencing the use of timberland were in effect (USFS, 1994). These laws governed timber management and harvesting, protected the general environment and sensitive habitat, preserved timbered areas, controlled water pollution and stream sedimentation, and protected roads and scenic areas.

Another study conducted in 1995 indicated that characterization of statewide forest practice regulatory programs depends on what was being protected (Ellefson et al., 1995). As of 1995, state forest practice regulatory programs existed in as few as 16 percent to as many as 54 percent of states in the country (Ellefson et al., 1995). The most common focuses of such regulatory programs were the habitat of rare and endangered species and the impacts of wildfire and insects and diseases. The authors noted that programs are seldom used to promote the public's interest in private recreation and aesthetic qualities.

Increasing restrictions on private lands will have three general impacts:

(1) increased planning and management costs, such as preparation of timber harvesting plans (THPs);

(2) more costly operating methods and procedures, such as the use of more lower impact logging systems such as yarder/skyline, helicopter, or "cut-to length" mechanized equipment; and

(3) alteration of harvest configuration or requiring that more timber be left standing, such as in riparian zones.

Over the last decade, planning and management costs for private forest managers have risen dramatically, including preparation costs for THPs. This has occurred because of increased analysis required for issues related to the protection of water quality, wildlife, and fish. Over the last decade, most major timber companies are spending more on administration and the gathering of information. This includes on-going monitoring and necessary scientific studies or habitat inventories. THPs cost more and often take longer to obtain than a decade ago. By one estimate the minimum costs of preparing THPs in the decade prior to 1994 increased by five to ten times, with minimum preparation costs reaching $8,000 to $20,000 by 1994 (Dykstra and Heinrich, 1996).

A second set of costs relates to operations, such as road construction and reconstruction, logging systems and operations, road maintenance and related closeout costs such as reforestation. Factors relating to these costs include terrain, young or old-growth forest type, total volume harvested, logging system used (such as tractor, yarder/skyline, or helicopter), volumes per acre, and limits to logging imposed by regulation. When applying timber harvest values to calculate yield tax payments, BOE allows landowners to make downward adjustments for logging systems, small total volumes, low volumes per acres, and counties that have special FPRs (BOE, 2000a). For their part, loggers also have been faced with increased costs related to equipment costs, liability, and other related matters.

Especially on the North Coast, rules of the California State Board of Forestry and Fire Protection (BOF) have led to the use of logging systems that depend more on yarder/skyline or helicopter. On-site costs for these logging systems are much higher than traditional tractor yarding. To the extent that logging contractors or timber companies invest in yarder/skyline or other more sophisticated equipment, both the initial investment and subsequent carrying costs are also higher.

BOF rules have led to the increased use of advanced logging systems, such as the cable yarder.

An additional timber management cost private landowners must absorb includes adjusting the configuration of harvest areas or leaving trees to protect riparian or wildlife habitat, scenic areas, or meeting other management restrictions designed to protect environmental values. To date, these costs have been much more evident on the North Coast than elsewhere. This is because landowners have been required to leave more timber and alter harvest patterns to address the needs of the Northern Spotted Owl and salmonids. Pressure to leave additional timber or change harvesting patterns on the North Coast could also arise over the next decade as water quality requirements are established. It is also possible that landowners in other parts of

California could face similar pressures should a subspecies like the California Owl be listed under the federal Endangered Species Act (ESA).

These increased costs, combined with an abundance of timber worldwide, have raised concerns that California producers cannot compete in the long run. For further discussion, see the online paper Is There a Future for Commercial Logging in California? (Harwood, 2001).

Increased regulatory costs on timberland owners: During the last five years, the BOF has changed its rules in California's North Coast to address watersheds listed as impaired under the federal Clean Water Act and to protect salmonids listed under the federal ESA. Additional restrictions retain trees that would have previously been harvested and also include requirements for erosion control, watercourse crossings, restoration, monitoring, and selection of alternative practices.

The adopted rules are expected to affect small and large timberland owners by increasing the cost for timber harvesting. These extra costs are associated with planning and operations, and may include but are not limited to: (1) additional planning; (2) construction and maintenance costs for roads and watercourse crossings; (3) the additional cost of professional consultants; and (4) costs associated with a reduction in long-term sustained yield.

Where landowners had not already invested in skyline cable logging and enhanced road maintenance, estimates suggested additions of around $30 per MBF for both logging and road-related costs (BOF, 2000). Watershed monitoring costs can range from $30,000 to $100,000 annually.

The most significant additional cost is the increase in the size and harvest restrictions within riparian zones. Depending on the rule draft, estimates of the economic costs of the increased conifer tree volume retention would be from four to 11 percent more. Additional long-term costs occur from increases in timber volume within riparian zones and unstable areas that cannot be harvested. Some estimates are as high as 50 percent (BOF, 2000).

Broad estimates for the regulations indicate that the overall, Statewide yearly cost could average at least $150 million per year depending on the level of restriction applicable to an ownership and the size of the area affected (BOF, 2000). Ultimately, BOF believed that the majority of the additional rule costs would be offset over the long-term by the benefits derived from enhanced watershed management.

Industry factors

Sawmill considerations

For sawmilling, as well as for other wood products and paper manufacturing enterprises, material costs substantially exceed both payroll and capital expenditure costs (U.S. Census Bureau, 2002j; Laaksonen-Craig et al., 2002). For example, in 2000 over 80 percent of the payroll, capital, and materials costs combined for the sawmills and wood preservation sector (NAICS industry code 3212) came from materials (U.S. Census Bureau, 2002j). Log costs and stumpage prices rose globally from 1988 to 1998. Sawmill owners have been squeezed between rising stumpage prices and a variety of other market factors.

Is there a regional competitive edge in logs? Regional timber prices come from a diversity of demand, supply, quality, and other issues that change each year. Based on analysis of regional timber producers in 2000, the four areas with the lowest delivered log costs were Chile, South Africa, Brazil and New Zealand. These were all countries with extensive pine plantations and related cost structures. Still, for a variety of reasons, none of these regions may be able to sustain a competitive edge over other areas in the next decade (International Wood Markets Research Inc, 2001a).

Sawmill technology has changed dramatically in the last 20 years with an emphasis being placed on the ability to maximize use of each log and of small diameter materials. California completed its

evolution to a lumber industry based on smaller material earlier than other western states and surviving sawmills have made significant investments in this technology. Significant capital investments are still being made by the sawmill and wood preservation sector in California, averaging over $58 million a year between 1997 and 2000. See Table 2 of the online document Geographic Area Statistics: 2000: Annual Survey of Manufactures for source information (U.S. Census Bureau, 2002j).

Whether or not this investment will be sufficient to keep up with investments in other parts of the country remains to be seen. Companies in Canada and the southern United States increasingly recognize the value of lumber recovery (Beck, 2002), thus improving their ability to compete with mills in the western United States and California. Historically, sawmills in the west have focused on improving lumber recovery as a way to offset log cost. Lumber recovery is the amount of lumber that can be cut from each log. By controlling log sizes, using thin-kerf saw technology, and improving operation and maintenance practices, mills have been able to recover twice as much wood from a single log as they could in 1970 (California Forestry Association, 2002; USFS, 2000). However, this advantage could diminish as mills in other areas improve their ability to increase lumber recovery.

Construction industry and residential considerations

The construction industry has faced increasing concerns over environmental protection during the construction process. This is reflected in more emphasis (and related cost) on sanitation, worker safety, protection of air and water quality, and public heath.

Materials used in construction also have changed. This is a mixed bag for lumber and traditional wood products. New substitute products are being developed that may offer more potential than wood. However, some of these new products also use wood. For example, increased use of recycled or demolition materials involve wood as well as steel and concrete. Fiber and plastic technologies apply to wood such as plastic-reinforced wood and fiber-reinforced concrete. New products include both wood in the form of engineered wood products and non-wood products such as geotextiles. Current technologies can use smaller diameter trees or wood wastes to develop engineered wood products. One example is the manufacture of OSB, which is a composite made from small wooden strands. OSB now exceeds use of softwood plywood in home construction. See the online document Sustainable Construction in the United States of America: A Perspective to the Year 2010 for a further discussion (Augenbroe, et. al., 1998).

Pulp and paper considerations

Increased used of recycled paper products has been made possible by new de-inking processes, better drying techniques, and improved sorting technologies.

In the pulp and paper sector, some important technological changes can be traced to relative scarcity or abundance of fiber resources. For example, public policies designed to recycle resources and to divert wastepaper from landfills actually increased the supply in the 1990s. Increased use of recycled paper products has been made possible by new de-inking processes, better drying techniques, and improved sorting technologies. See the online paper Wood Products Technology Trends: Changing the Face of Forestry for more information (Skog et al., 1995).

However, the cost structure of the pulp and paper industry raises some concern. According to accounting firm, PricewaterhouseCoopers, the five largest United States companies accounted for 62 percent of total capital expenditures of the 30 United States companies on the list in 2000, about the same percentage as in 1999. United States capital expenditures came to 6.4 percent of sales; except for Japan, this is the lowest rate of investment of all the timber producing regions. The return on capital expenditure was 7.3 percent in 2000, about the same as in 1999. This continues to be well below what PricewaterhouseCoopers calls a reasonable benchmark rate for United States companies of eight to 10 percent. Only six of the 30 United States top 100 companies achieved 10 percent or better, with another five achieving between nine and 10 percent. Return on shareholder's common equity amounted to 14.9 percent in 2000, up from 14.3 percent in 1999. The impact of lower return on capital investment in the pulp and paper industry is in effect reducing the industry's capital base. To attract capital in a highly competitive market, the industry must increase profits and/or use of capital (PricewaterhouseCoopers, 2001).

Industry structure and market considerations

The ownership of forest lands and the structure of the forest products industry in the United States and California have been undergoing significant change. This is due to several causes.

The first cause is aging of landowners who own a significant share of United States forest land, either individually or as part of closely held companies. As individuals grow older, they need to restructure their estates including liquidation of forest holdings. This may increase the division of larger land parcels into smaller ones and encourage the movement of more productive timberlands into corporate ownerships or even alternate land uses. At the same time, it may provide significant opportunities for acquisitions by different institutional owners such as trusts (Best et al., 1999). Whether this will lead to willingness to make additional investments in California forest lands is unknown.

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Another cause has been efforts by companies in the 1990s to improve shareholder returns by restructuring to capture the increasing value of their stumpage (Best et al., 1999). During the 1990s, a number of publicly traded forest products companies in the United States showed poor financial performance. However, one area of consistent gain was the rise in timber and timberland value. In response, many companies restructured their ownerships to show improved profits by capturing this appreciated value (Best et al., 1999). Two major timber companies sold their timberlands in California as part of this kind of action.

A third cause is the movement of financial investors such as pension funds and investment partnerships into forest land ownership (Best et al., 1999). More than forest products companies, this kind of investor views forest land as a financial asset that should be managed as part of a portfolio of investments. In the financial view, the value of forest land may play many roles and be marketed through a variety of financial instruments and securities.

A final cause during the 1990s has been the relative oversupply of wood fiber from Asia that allows United States companies to purchase more timber from foreign sources making it profitable to spin off

timberlands (Best et al., 1999). To the extent that this abundance of timber keeps price low, it works against investment in higher cost areas such as California (Best et al., 1999).

Perhaps the strongest constraint for expansion of forest products from California is that it operates in both a national and global market. Nationally, California competes against other regions of the country, such as the Southern States, with a substantial ability to grow trees and make forest products. Internationally, both California and the United States operate in a global forest products industry that has many low-cost competitors. These competitors have access to labor and raw materials that are less expensive and possess rapidly growing plantations and efficient manufacturing capability.

Compared to California's historic reliance on managed natural stands, the global trend is towards establishing more plantations to provide industrial roundwood. The Food and Agriculture Organization of the United Nations (FAO) estimates that about 54 percent of the global area of industrial plantations in 1995 comprised trees less than 15 years of age, with 21 percent planted between 1990 and 1995. The plantations that are older than 50 years are located mostly in temperate and boreal regions (FAO, 2002).

In recent years, Asia has been the major region for new plantings. Since 1985, over half of global industrial plantations have been in Asia. The future significance of these plantings is suggested by the experience of countries whose plantations are now maturing. For example, in New Zealand and Chile wood from plantations has allowed these countries to meet all their domestic wood needs and also to support a significant export industry (FAO, 2001). The FAO estimates that the percentage of planted forests could rise from 50 to 75 percent of the world's industrial wood need by 2030. Others believe that the world's demand for industrial wood could be met on an area less than 10 percent of the current global forested area (Sedjo and Botkin, 1997).

In addition to wood fiber that will be coming from plantations, substantial investments are being made in foreign countries to install modern technology that significantly raises productivity. One example of this is that Europe now has the world's four largest sawmills; and in general, European mills have the same level of productivity seen in North American sawmills (Taylor, 2002). Another example is Australia, where international forest industry companies are making investments that will lead to a competitive plantation-based pine industry (International Wood Markets Research Inc, 2001b).